

REMOTE SENSING IN THREE DIMENSIONS: THE INTEGRATION OF NEW GLOBAL DATA SETS

Robert E. Crippen and Ronald G. Blom

Jet Propulsion Laboratory, MS 300-233
California Institute of Technology
Pasadena, California 91109 USA
818-354-2475 Phone
818-354-9476 Fax
Robert. E.Crippen@jpl.nasa.gov

SUMMARY

The advent of both a high-resolution near-global elevation model (via SRTM) and even higher (much higher) resolution global satellite imagery (e.g. Ikonos) raises the question of how these and other new data sets might benefit from synergistic mergers. We have run tests, with surprising results, that indicate that such mergers will have extraordinary benefits.

Even given their 30:1 difference in resolution, 30m DEMs can be used to create synthetic stereoscopic images from monoscopic 1m Ikonos images, *with depth perceived at or near the resolution of the image*. How is this possible? Clearly the answer relates to perceptual reinforcement (synergism) between the high-frequency image shading and the lower-frequency stereoscopic disparity depth cues. The perceptual system recognizes a relationship between shading and depth at lower spatial frequencies and extrapolates the relationship to higher frequencies. This result shows that the merger of imagery with DEMs can (1) substantially extend the effective resolution of the DEM while (2) distinguishing the irradiance and reflectance patterns in the image, both to the great benefit of terrain analyses.

We will provide several examples that demonstrate the critical difference DEMs can make in the application of remotely sensed imagery to exploration and natural hazards assessment. Images will be presented in full color and with stereoscopic depth (3-D) without the need for the audience to wear special glasses.

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